39) Since the inverse graph is linear, this is a 2nd order reaction.

The y-intercept of the graph is 1/[A]. $1/[A] = 10$, so $[A] = 0.1$ mol/L

41) a. $[A] = -kt + [A]_o$

$[A] = -0.050\,t + 1.0 \times 10^{-3}$

b. $t_{1/2} = \dfrac{[A]_o}{2k} = \dfrac{[1.0 \times 10^{-3}]}{2(0.050)}$ **= 0.010 s**

c. $[A] = -0.050(5.0 \times 10^{-3}) + 1.0 \times 10^{-3}$

$[A] = 7.5 \times 10^{-4}$ mol/L

Since 7.5×10^{-4} M of A remains, the other 2.5×10^{-4} M must have been consumed. Therefore, **2.5×10^{-4} M of B has been produced.**

43) a. $\ln[A] = -kt + \ln[A]_0$ I will choose 1.0M as the initial concentration.

$\ln[0.25] = -k\,(320) + \ln[1.00]$

$-1.3863 = -k\,(320) + 0$

$k = 0.00433\ s^{-1}$

$t_{1/2} = \dfrac{\ln 2}{k} = \dfrac{0.693}{0.00433}$ **= 160. s**

$\ln[0.10] = -0.00433\,t + \ln[1.00]$

t = 532 s

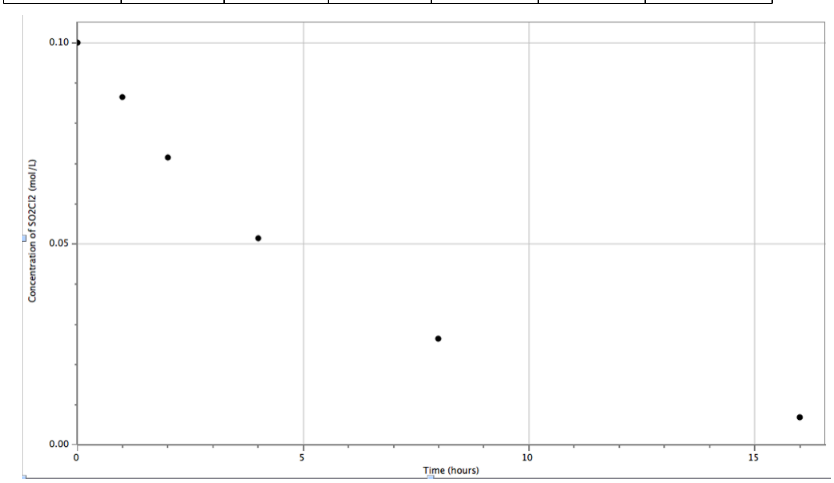
72) To find the concentration of SO_2Cl_2, we can use the ideal gas law:

$PV = nRT$

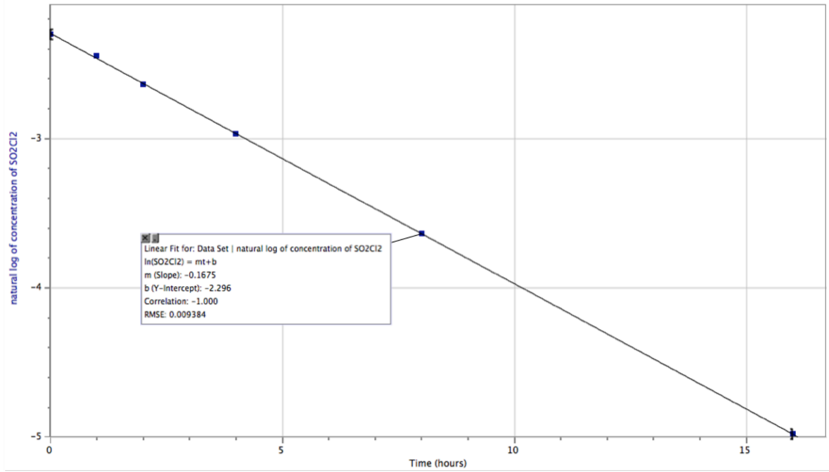
$\dfrac{P}{RT} = \dfrac{n}{V}$

example: $\dfrac{4.93\text{ atm}}{(0.08206)\ 600.\text{K}} = 0.100\text{M } SO_2Cl_{2\,(g)}$

$P_{SO_2Cl_2}$	4.93	4.26	3.52	2.53	1.30	0.34
$[SO_2Cl_2]$	0.100	0.0865	0.0715	0.0514	0.0264	0.00690



Plotted natural log of $[SO_2Cl_2]$



a. $\ln[SO_2Cl_2] = -kt + \ln[SO_2Cl_2]_0$

k = 0.168 hr^{-1} (slope of graph)

b. $t_{1/2} = \frac{\ln 2}{k} = \frac{0.693}{0.168}$ **= 4.13 hr**

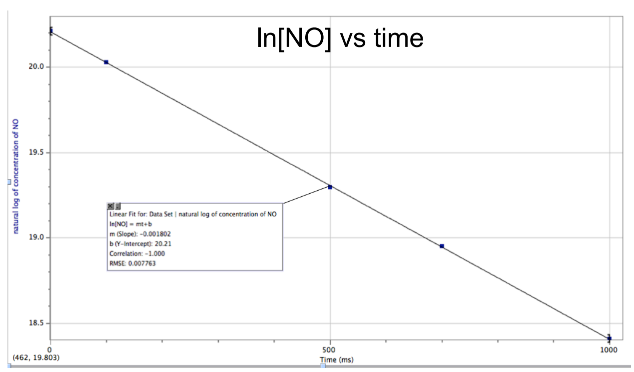
c. $\ln[SO_2Cl_2] = -0.168\ (20) + \ln[0.100]$

$\ln[SO_2Cl_2] = -5.663$

$[SO_2Cl_2] = 0.00345\ M$

$\frac{0.00345\ M}{0.100\ M} \times 100 =$ **3.45% left**

81) When I replot with ln[NO] on the y-axis, I get a linear regression, so it is 1st order with respect to NO.

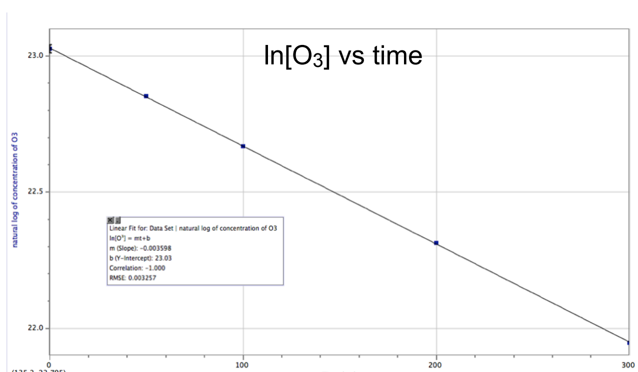


Rate = k [NO]

k' = 0.0018 ms^{-1}

or 1.8 s^{-1}

When I replot $\ln[O_3]$ on the y-axis I also get a linear regression, so it is 1st order with respect to ozone.



Rate = k $[O_3]$

k" = 0.0036 ms^{-1}

or 3.6 s^{-1}